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(71) Applicant (for all designated States except US): **KONINKLIJKE PHILIPS ELECTRONICS N.V.** [NL/NL];  
Groenewoudseweg 1, NL-5621 BA Eindhoven (NL).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **STALLINGA, Sjoerd** [NL/NL]; c/o Prof. Holstlaan 6, NL-5656 AA Eindhoven (NL). **SKORIC, Boris** [NL/NL]; c/o Prof. Holstlaan 6, NL-5656 AA Eindhoven (NL). **TUYLS, Pim, T.**

[BE/BE]; c/o Prof. Holstlaan 6, NL-5656 AA Eindhoven (NL). **OPHEY, Willem, G.** [NL/NL]; c/o Prof. Holstlaan 6, NL-5656 AA Eindhoven (NL). **AKKERMANS, Antonius, H., M.** [NL/NL]; c/o Prof. Holstlaan 6, NL-5656 AA Eindhoven (NL).

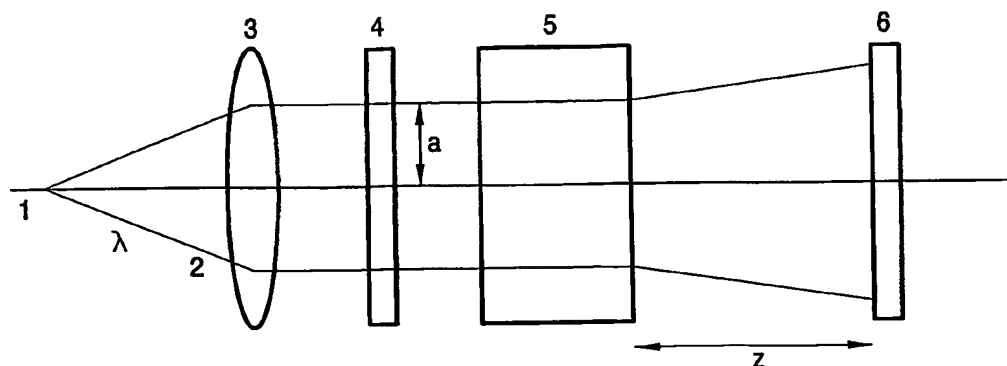
(74) Agents: **UITTENBOGAARD, Frank et al.**; Prof. Holstlaan 6, NL-5656 AA Eindhoven (NL).

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(54) Title: A METHOD AND APPARATUS FOR DETECTION OF A SPECKLE BASED PHYSICALLY UNCLONABLE FUNCTION



(57) Abstract: An optical arrangement of at least a coherent light source (1), a strongly scattering object (5) (the PUF), and a pixelated photo-detector (6), wherein the pixels are comparable in size with the bright and dark patches of the speckle pattern produced by coherent radiation traversing the scattering object (5). Quantitatively, the pixel size should be roughly  $\lambda/NA$ , where  $\lambda$  is the wavelength, and (i)  $NA=a/z$  for free-space geometry, with  $a$  being the beam radius and  $z$  being the distance between the exit surface of the PUF (5) and the pixelated detector (6), or (ii)  $NA$  is the numerical aperture of a lens (7) in an imaging geometry. In a preferred embodiment of the invention, there are tentative requirements that the pixels should be at least smaller than  $\eta_{\max}\lambda/NA$  and preferably larger than  $\eta_{\min}\lambda/NA$ , where (in an exemplary embodiment)  $\eta_{\max}=5$  and  $\eta_{\min}=0.05$ , say. It will be understood by a person skilled in the art that the present invention is concerned with the optical arrangement of the PUF (5) and the photo-detector (6), rather than the photo-detector (6) *per se*.



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